

CLAIMS

1. A method for operating a node in a computer network, the node connected to other nodes by links, comprising:

determining at least one alternate path for one or more said links;
reserving resources for said at least one alternate path; and
rerouting traffic on said at least one alternate path in case of a link failure.

2. A method as in claim 1, further comprising:

periodically updating said at least one alternate path.

3. A method as in claim 1, further comprising:

determining a plurality of alternate paths for each link, and said plurality of alternate paths do not have any link in common.

4. A method as in claim 1, further comprising:

rerouting user traffic substantially simultaneously to each link of said at least one alternate path.

5. A method as in claim 1, further comprising:

reserving resources on said at least one alternate path for switching real-time connections first.

6. A node in a computer network connected by links, said node comprising:

means for determining at least one alternate path for one or more said links;

means for reserving resources for said at least one alternate path; and

means for rerouting traffic on said at least one alternate path in case of a link failure.

7. A node as in claim 6, further comprising:

means for periodically updating said at least one alternate path.

8. A node as in claim 6, further comprising:

means for determining a plurality of alternate paths for each link, and said plurality of alternate paths do not have any link in common.

9. A node as in claim 6, further comprising:

means for rerouting user traffic substantially simultaneously to each link of said at least one alternate path.

10. A node as in claim 6, further comprising:

means for reserving resources on said at least one alternate path for switching real-time connections first.

11. A node in a computer network connected by links, said node comprising:

a transit connection manager (TCM) adapted to

set up transit connections,

update routing tables,

route traffic; and

an alternate path manager adapted to

determine at least one alternate path for each link,

allocate connections on said at least one alternate path,

reserve resources on said at least one alternate path,

request to said TCM the rerouting of traffic on said at least one alternate path in case of a link failure.

12. The node according to claim 11, further comprising:

for each outbound trunk, said at least one pre-selected alternate path is a plurality of alternate paths and the plurality of paths do not have any link in common.

13. The node according to claim 11, further comprising:

said alternate path manager adapted to reroute said user traffic to each link of said at least one alternate path.

14. The node according to claim 11, further comprising:

said alternate path manager adapted to reserve resources on said at least one alternate path for making real-time connections first.

15. A node in a computer network connected by links, said node comprising:

a transit connection manager (TCM) adapted to

set up transit connections,

update routing tables,

route traffic; and

an alternate path manager adapted to

determine at least one alternate path for each link,

allocate connections on said at least one alternate path,

reserve resources on said at least one alternate path,

request to said TCM the rerouting of traffic on said at least one alternate path in case of a link failure,

periodically re-determine at least one alternate path for each link in response to user traffic, network resources, and quality of service changes.

16. The node according to claim 15 further comprising:

said alternate path manager adapted to periodically update said re-determined at least one alternate path after a predetermined period of time.

17. A method of non-disruptive packet switching in a network having nodes interconnected with transmission trunks, said method comprising:

pre-selecting at least one alternate path for each trunk;

reserving connections at each node to make said at least one alternate path;

reserving bandwidth resources to transmit packets on said at least one alternate path; and

switching the path of a packet from a particular trunk, in response to failure of said particular trunk, to said at least one alternate path.

18. The method according to claim 17 further comprising:

for each outbound trunk, said at least one pre-selected alternate path is a plurality of alternate paths, and the plurality of paths do not have any trunk in common.

19. The method according to claim 17 further comprising:

rerouting said user traffic to each trunk of said at least one alternate path.

20. The method according to claim 17 further comprising:

reserving resources said at least one alternate path for making a real-time connection first.

21. A method of non-disruptive packet switching in a network having nodes interconnected with transmission trunks, said method comprising:

pre-selecting at least on alternate path for each trunk;

reserving connections at each node to make said at least one alternate path;

reserving bandwidth resources to transmit packets on said at least one alternate path;

switching the path of a packet from a particular trunk, in response to failure of said particular trunk, to said at least one alternate path; and

re-selecting at least one new alternate path for each trunk in response to user traffic, network resources, and quality of service changes.

22. The method according to claim 21 further comprising:

periodically updating said re-selected at least one new pre-selected alternate path after a predetermined period of time.

23. A packet switching computer network comprising:

a plurality of nodes interconnected by links, said nodes having

a transit connection manager (TCM) adapted to

set up transit connections,

update routing tables,

route traffic; and

an alternate path manager adapted to

determine at least one alternate path for each link,

allocate connections on said at least one alternate path,

reserve resources on said at least one alternate path,

request to said TCM the rerouting of traffic on said at least one
alternate path in case of a link failure.

24. The network according to claim 23 further comprising:

for each outbound trunk, said at least one pre-selected alternate path is a plurality
of alternate paths, and the plurality of paths do not have any trunk in common.

25. The network according to claim 23, further comprising:

said alternate path manager adapted to reroute said user traffic to each trunk of said at least one alternate path.

26. The network according to claim 23 further comprising:

said alternate path manager adapted to reserve resources on said at least one alternate path for real-time connections first.

27. A packet switching computer network comprising:

a plurality of nodes interconnected by links, said nodes having

a transit connection manager (TCM) adapted to

set up transit connections,

update routing tables,

route traffic; and

an alternate path manager adapted to

determine at least one alternate path for each link,

allocate connections on said at least one alternate path,

reserve resources on said at least one alternate path,

request to said TCM the rerouting of traffic on said at least one

alternate path in case of a link failure,

periodically re-determine at least one alternate path for each link in response to user traffic, network resources, and quality of service changes.

28. The network according to claim 27 further comprising:

said alternate path manager adapted to periodically update said re-determined at least one alternate path after a predetermined period of time.

29. A method in a node of a packet switching communication network having a plurality of access (202..205) and transit nodes (201..208) interconnected with transmission trunks (209), for, in case of failure or unavailability of an outbound trunk (800), rerouting user traffic to an alternate path (805, 806), said method comprising:

searching, pre-selecting, and storing at least one alternate path (805, 806) between origin node (803) and destination node (804) of each outbound trunk (800), said searching, pre-selecting and storing done in response to existing user traffic, network resources, and requested quality of service;

pre-allocating connections to said at least one alternate path;

reserving resources on said at least one alternate path;

and, in case of failure or unavailability of an outbound trunk, the further steps of:

activating said at least one alternate path; and

rerouting the user traffic on said activated at least one alternate path.

30. The method according to claim 29 further comprising:

updating said stored at least one pre-selected alternate path in response to user traffic, network resources, and quality of service changes.

31. The method according to claim 29 further comprising:

periodically updating said stored at least one pre-selected alternate path after a predetermined period of time.

32. The method according to claim 29, further comprising:

for each outbound trunk, said at least one pre-selected alternate path is a plurality of alternate paths and the plurality of paths do not have any trunk in common.

33. The method according to claim 29 further comprising:

transmitting said user traffic over the network in at least one end-to-end connection established between access nodes.

34. The method according to claim 29 further comprising:

rerouting said user traffic to each trunk of said at least one alternate path.

35. The method according to claim 29 further comprising:
reserving resources on said at least one alternate path for real-time connections first.
36. A system for carrying out the method according to claim 29.
37. A node comprising: means for carrying out the method according to claim 29.
38. A network comprising at least one node according to claim 37.
39. A computer readable media, comprising:
said computer readable media containing instructions for execution in a processor for the practice of the method of claim 1 or claim 17 or claim 21 or claim 29.
40. Electromagnetic signals propagating on a computer network, comprising:
said electromagnetic signals carrying instructions for execution on a processor for the practice of the method of claim 1 or claim 17 or claim 21 or claim 29.